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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/882,699	06/15/2001	Xiaoming Ren	107044-0009	1351

24267 7590 05/23/2005

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EXAMINER	
YUAN, DAH WEI D	
ART UNIT	**PAPER NUMBER**
1745	

DATE MAILED: 05/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/882,699	REN, XIAOMING	
	Examiner	Art Unit	
	Dah-Wei D. Yuan	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 April 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22 and 24-116* is/are pending in the application.

4a) Of the above claim(s) *1-22 and 63-116* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *24-62* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 June 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

METALIC LAYER COMPONENT FOR USE IN A DIRECT OXIDATION FUEL CELL

Examiner: Yuan S.N. 09/882,699 Art Unit: 1745 May 18, 2005

Detailed Action

1. The Applicant's amendment filed on April 26, 2005 was received. Claim 23 was cancelled. Claims 114-116 were added.

2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action issued on November 26, 2004.

Election/Restrictions

3. Newly submitted claims 114-116 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: The subject matter of aforementioned claims is "a direct oxidation fuel cell comprising an anodic metallic diffusion layer comprises of a metallic plate having alternating rows of pores therein" in claim 114 and "a direct oxidation fuel cell comprising a metallic layer component fabricated of microscopic particles that have been heated and bonded together such that openings are created " in claim 115, which is a distinct species from the "a direct oxidation fuel cell comprising an anodic metallic diffusion layer having a plurality of openings therein" as recited in the original claims.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 114-116 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 102

4. The claim rejections under 35 U.S.C.102(e) on claims 24-30,33,37,38,41-51,54-62 as being anticipated by Cisar et al. (US 6,410,180) are maintained. The rejection is repeated below for convenience.

With respect to claims 24, 61,62, Cisar et al. teach a fuel cell that is suitable for operating with gas fuels or, alternatively, directly with liquid fuels, such as methanol. The direct oxidation fuel cell comprises (a) a protonically conductive, electronically non-conductive membrane (54), (b) an anodic metal diffusion layer (metal grid, 82), (c) an anode catalyst (electrocatalyst, 56), which is disposed between the anode catalyst and the anode face of the membrane and (d) a cathode catalyst, which is disposed between the cathode catalyst and the cathode side of the housing. The metal grids can be selected from a wide variety of material including expanded metal, woven metal wire product and perforated metal sheets. See Column 10, Lines 16-54, Column 12, Lines 39-67; Column 13, Lines 27-42; Figures 6B,11. The metal grids are used to increase the gas flow to and from the catalyst areas and to conduct the current from one cell to the adjacent cell.

With respect to claims 25,26, the metal grid (electrically conductive member) may be a sheet of expanded metal mesh or wire. The expanded metal mesh or other electrically conductive member preferably has a great portion of open area than does carbon cloth or paper to increase the gas to and from the catalyst areas.

With respect to claim 27, the metal grid can be an expanded metal, a product fabricated by piercing and stretching a sheet of metal or metallic foil. A wide range of materials can be used including titanium, nickel, copper, stainless steel, aluminum and niobium.

With regard to claim 28, the metal grid can be further gold plated to reduce the contact resistance; i.e., it is inert to the liquid fuel used.

With respect to claims 29 and 33, in addition to expanded metal, perforated metal sheets and woven metal wire products, i.e., pieces of metal bonded together that have spaces therebetween, are suitable to employ as the metal grid as well. Both forms of grids have pores with more than one dimension.

With respect to claims 30 and 37, mixture of Vulcan XC-72R carbon powder, PTFE, water and surfactant are sonicated to reach complete dispersion and the resulting paste is spread onto the expanded foil grid.

With respect to claims 41,42,43, the metal grid is also used as a current collector. Figure 1 show the typical arrangement of a fuel cell in which flow field plates are disposed parallel to the anodic diffusion layer.

With respect to claims 44-51,54-56, due to similarity and mirror image between the anodic diffusion layer and cathode diffusion layer on the cathode side of the protonically conductive electronically non-conductive membrane (see Figure 6A), the aforementioned arguments of the former are applicable to the latter.'

With respect to claims 57-60, Cisar et al. teach the best way to lower contact resistance and improve corrosion resistance is to plate the metallic grid with a layer of precious metal, such

as gold, platinum, palladium or ruthenium. See Abstract, Column 2, Lines 58-63; Column 9, Lines 38-67; Column 10, Lines 16-60; Column 12, Lines 39-55; Column 13, Lines 1-55; Example 1.

It is noted that claim 38 is a product-by-process claim. "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F. 2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Since Cisar's bonded metal piece (woven metal wire) is similar to that of the Applicant's, Applicant's process is not given patentable weight in this claim.

Claim Rejections - 35 USC § 103

5. The claim rejections under 35 U.S.C. 103(a) as unpatentable over Cisar et al. (US 6,410,180) as applied to claims 24-30,33,37,38,41-51,54-62 above, and further in view of Yu et al. (US 6,399,202) on claims 31,32,34-36,39,40,52,53 are maintained. The rejection is repeated below for convenience.

Cisar et al. teach a direct oxidation fuel cell system as described above in Paragraph 4. However, Cisar et al. do not disclose the metallic diffusion layer is treated with a substance that renders a portion of the layer hydrophilic. Yu et al. disclose a gas-diffusion electrode for use in a fuel cell system. Specifically, Yu et al. teach the fabrication of gas diffusion electrode with a

precisely controlled degree of hydrophobic and/or hydrophilic characteristics by using functional groups. Water-repellent structures of the diffusion layer are generally achieved by coating the surface with a hydrophobic material, such as polytetrafluoroethylene. The most common method to make the diffusion layer partly hydrophilic includes the use of a hydrophilic fluorinated resin, such as NAFION. As a result, the gas diffusion layer, which has attached at least one hydrophilic organic group as well as at least one hydrophobic organic group, can better promote a hydrophobic/hydrophilic balance in the active layer. See Column 1, Lines 66-67; Column 2, Lines 35-41; Column 3, Lines 17-45; Column 6, Lines 32-37. Therefore, it would have been obvious to one of ordinary skill in the art to treat the gas diffusion layers of Cisar et al. with both PTFE and NAFION®, because Yu et al. teach the importance of optimum hydrophilic/hydrophobic properties on the gas diffusion layers.

With respect to claims 34,35, Yu et al. teach the gas diffusion layer is attached with at least one hydrophilic organic group and at least one hydrophobic organic group. Yu et al. do not specifically disclose relationship between the pore size of the gas diffusion layer and hydrophilicity (or hydrophobicity). However, it is the position of the examiner that such characteristics are inherent, given that pores of different sizes are distributed randomly on the metallic diffusion layer, therefore, at least some of the large pores would be treated with a hydrophilic material while at least some of the small pores would be treated with a hydrophobic material. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature *is necessarily present in that which is described in the reference.* In re Robertson, 49 USPQ2d 1949 (1999).

Response to Arguments

6. Applicant's arguments filed on April 26, 2005 have been fully considered but they are not persuasive.

Applicant's principle arguments are

(a) Cisar's gas diffusion layer is uncatalyzed carbon which has a metal grid disposed therein to improve conductivity;

(b) the limitation "openings being of a size so as to regulate mass transport of an associated fuel substance therethrough" in the claim is not disclosed in Cisar reference;

(c) new claims 14 through 122 are not taught or suggested by the Cisar reference.

In response to Applicant's arguments, please consider the following comments.

(a) The recitation of "comprising" in claim 24, line 1 is an open language, which can encompass additional material/component;

(b) Cisar teach the electrically conductive member may be a sheet of expanded metal mesh or wire, preferably expanded metal mesh. The expanded metal mesh or other electrically conductive member preferably has a greater portion of open area than does carbon cloth or paper to increase the gas flow to and from the catalyst areas. See Column 10, Lines 16-25. In addition, Cisar teaches the use of expanded metals having different open fractions in which high open area are more conducive to gas exchange. See Column 13, Lines 27-42. Thus it is conducted that the openings of the metal mesh is varied so as to regulate (control) the mass transport of the fuel gas;

(c) in the amendment filed April 26, 2005, only claims 114 to 116 were added.

Conclusion

7. **THIS ACTION IS MADE FINAL**. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dah-Wei D. Yuan whose telephone number is (571) 272-1295. The examiner can normally be reached on Monday-Friday (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan, can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dah-Wei D. Yuan
May 18, 2005

DAH-WEI YUAN
PRIMARY EXAMINER